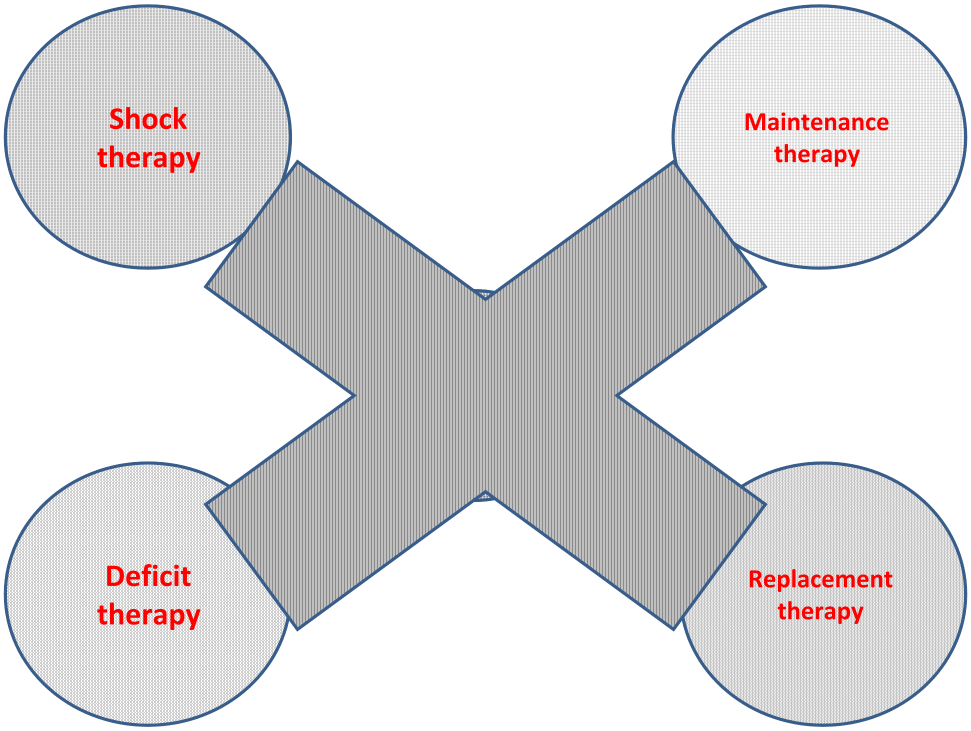
FLUID THERAPY
IN
GE

Dr.mohammed basuoni
MRCPCH



Shock therapy

Maintenance therapy

Deficit therapy

Replacement therapy

Shock therapy

Amount: 20 ml /kg

Type: normal saline or lactated ringer IV or Intraossious

Time: given as fast as possible up to 1 hour according to clinical condition

May be given 3 to 5 times but more than 3 should consider another cause of shock rather than hypovolemia

((nelson2016))

Signs of improvement on shock therapy

Lowering heart rate

Normal blood pressure

Improved perfusion

Better urine output

More alert affect

((nelson2016))

Deficit therapy

Amount: according to degree of dehydration

	mild	mod	sever	
infant	40	80	100	Ml /kg
child	30	60	90	Ml/kg

Type: glucose 5%+normal saline+1ml kcl /100ml fluids((nelson2016))

……or.. :glucose 5%+1/2 normal saline+1mlkcl/100ml((current 2014)) like maintenance fluids exactly((glucose 10 %:saline 1:1))………preferred due to same composition as maintenance fluids

……or….:glucose 5%+1/4 normal saline+1ml kcl/100ml((ped emerg secrets2014))

Time :on 24 hours mixed with maintenance((nelson2016))

Signs of improvement on deficit therapy

No physical signs of dehydration((dep. Fonta…sunken eyes…..dry tongue….decreased skin elasticity…………….

Regaining previous wt

Normalization of the vitals((HR..BL P..UOP))

((nelson2016))

Maintenance therapy

Amount:

Less than 10 kg	100ml/ kg
10 kg to 20 kg	50 ml/kg
More than 20 kg	20 ml /kg

Type: glucose 5%+1/2 normal saline+1ml kcl/ 100 ml fluids

Time: on 24 hours

((Nelson 2016))

Replacement therapy

Amount: ongoing loss

diarrhea	5-10 ml/kg for each diarrhea
vomit	2-5 ml /kg for each vomit

Type:

diarrhea	As maintenance	+3meq Na HCO3/100ml fluids
vomit	Normal saline	0.5 ml kcl /100ml fluids

Time: evaluate every 6 hours and added to the next 6 hours as ORS ..if not tolerated so given as I V fluids

((nelson 2016---UK ped guidelines 2014))

Severity of dehydration((Nelson 2016))

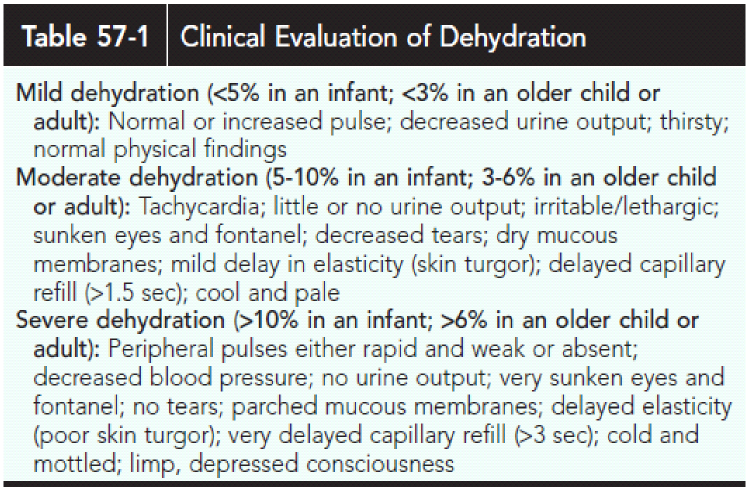


Table 57-1 Clinical Evaluation of Dehydration

Mild dehydration (<5% in an infant; <3% in an older child or adult): Normal or increased pulse; decreased urine output; thirsty; normal physical findings

Moderate dehydration (5-10% in an infant; 3-6% in an older child or adult): Tachycardia; little or no urine output; irritable/lethargic; sunken eyes and fontanel; decreased tears; dry mucous membranes; mild delay in elasticity (skin turgor); delayed capillary refill (>1.5 sec); cool and pale

Severe dehydration (>10% in an infant; >6% in an older child or adult): Peripheral pulses either rapid and weak or absent; decreased blood pressure; no urine output; very sunken eyes and fontanel; no tears; parched mucous membranes; delayed elasticity (poor skin turgor); very delayed capillary refill (>3 sec); cold and mottled; limp, depressed consciousness

PEARLS

Shock amount should be subtracted from deficit amount

Deficit therapy is given in all types of dehydration in 24 hours except in hypernatremic dehyd according to s. Na

□□-□□□	Ɣü΄Yγ□ □
□□-□□□	Ɣü΄Yγ□ □
□□-□□□	Ɣü΄Yγ□ □
□□-□□□	Ɣü΄Yγ□ □

For fear of brain odema

Deficit means past loss

Replacement means ongoing loss

In sever dehydration I can give the deficit as ORS if the baby tolerate and has no contraindications of oral intake

((nelson2016))

In any time I can stop iv fluids and give the rest of my calculations as ORS according to the condition of the baby((fully conscious. Tolerates oral..no persistent vomiting.. Stable vitals))

Shock therapy cannot be given by enteral route

Any case candidate for IV fluids should do basic labs including((blood urea ,serum creat..s.Na..s.K..ABG))

In cases of hypernatremia follow serum Na every 4 hours

Electrolyte correction

Hyponatremia=((desired((125))-actual))*wt* 0.6

Corrected on 24 hours but reevaluate after 8 h

Manifested hyponatremia((convulsions))=4 ml /kg hypertonic saline in 30 minutes to 1 hour

hypokalemia

Mild((3.5-3) moderate(3-2.5) sever(<2.5)

Hypokalemia=((desired ((4))-actual))*0.4*wt

Sever and symptomatic???

Amount given on ((rate 0.2 meq/kg/hour

added to saline

In conc of 4 meq /100ml fluids in peripheral line

In conc of 8 “”””””””””””””””””””””””””” central line

Then re-evaluate

Baby 10 kgs K is 2.5 meq

10 *1.5*0.4=6meq

So we can give this amount on 3 hours correction if the baby is symptomatic

If asymptomatic so give it on 8 -12 h

And re evaluate

Hyperkalemia

Stop K adminestration

Monitor by ECG

Give IV calcium gluconate((0.5ml/kg)) on 5-10 minutes if there is ECG changes

Frequent salbutamol nebulizations((every 2-6 h))

IV sodium bicarbonate (1 mmol/kg

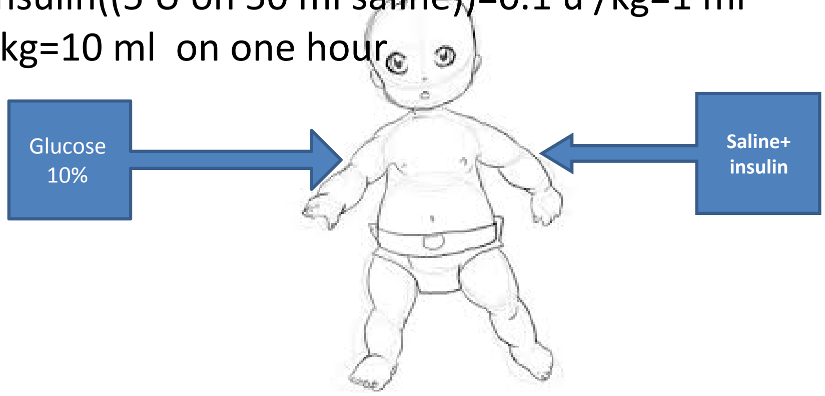
over 15-30 min) specially in presence of metabolic acidosis

Glucose ((5ml/kg of conc 10%)) insulin ((0.1 u/kg))((prepared as 5u+50 ml saline)) given in separate line from glucose to control the glucose readings easily))

over 1 hour and can be repeated

Kayexalate is an exchange resin that is given either rectally or orally.

- Baby 10 kg
- Glucose 10%= 5ml/kg=5o ml on one hour
- Insulin((5 U on 50 ml saline))=0.1 u /kg=1 ml /kg=10 ml on one hour



Glucose 10%

Saline+ insulin

Hco3=base deficit *0.3*wt/2

Given on 1 hour then re-evaluate

Indications of NaHCO3 in dehydration:

PH less than 7.1 after shock therapy

Bicarb less than 8….rather than that give the full chance to correction by fluids

hypernatremia

Restore intravascular volume: Normal saline: 20 mL/kg over 20 min

Determine time for correction on basis of initial sodium concentration

fluid: 5% dextrose + half-normal saline (with 20 mEq/L KCl unless contraindicated)

Typical rate: 1.25-1.5 times maintenance((140%))

Follow serum sodium concentration((every 2 -4 hours))

Adjust fluid on basis of clinical status and serum sodium concentration:

Signs of volume depletion: administer normal saline (20 mL/kg)

Sodium decreases too rapidly; either: Increase sodium concentration of intravenous fluid ((1:1..1:2…1:3))or Decrease rate of intravenousfluid by 20 %(if baby is near to be hydrated)

Sodium decreases too slowly; either: Decrease sodium concentration of intravenous fluid or Increase rate of intravenous fluid by 20% (if baby is still dehydrated)

((nelson2016))

ORS

Indications of ORS:

Mild dehydration

Moderate dehydration if has no(((((disturbed conscious level….sever vomiting…shock…..sever diarrhea more than 20 ml /kg /hour…….ileus….poor adherence)))

Can be tried in sever dehydration after giving the shock therapy

((ped emerg secrets 2014))((Uk ped guidelines 2014))

ORS may be given by Ryle in:

cases of refusal of oral intake

Taking inadequate volumes

persistent vomiting((more than 4 times in 2 hours or more than 10 times in 24 hours))

Case with sever dehydrations

Wt 12 kg

Sever dehydration

…..first he will come to our ER and will be assessed

The emergency doctor decided to give the baby shock therapy

A canula will be inserted

Labs withdrawen((ABG,,urea..creat..Na..K)) and others according to clinical cond

20 ml saline *12 kg=240 ml given as rapid as clinical cond needs

After end of 1st bolus he will reassess for need of repeating the dose or not

Admission will be prepared

Calculation of deficit((according to degree of dehyd)) and maintenance

Deficit=100% of the maintainance=100% *1100=1100

Maintenance =1100

Deficit +maintenance devided by 24 hours

Substract the amount of shock therapy

So 2200 -240 =1960 /24 =80 ml /hour

Waiting serum Na the rate will be corrected according

In cases of hypo or iso Na no correction of the rate

In cases of hypernatremia the amount of deficit will be devided on more than 24 h according

For example serum Na is 178….

Amount of deficit will be devided on 3 days:

So total amount daily will be (((full maintenance+1/3 deficit))=1100+350

Follow Na every 4 hours ((Na should be decreased 12 meq daily))

GE with no dehydration

Shock therapy:no

Deficit therapy:no

Maitenance therapy: normal baby feeds

Ongoing loss: ORS….5 -10 ml / kg /one diarrhea
3-5 ml /kg/one vomit

GE with mild dehydration

Shock therapy:no

Deficit therapy:30-50 ml ORS/kg on duration 4 hours

Maitenance therapy: normal baby feeds

Ongoing loss: ORS….5 -10 ml / kg /one diarrhea
3-5 ml /kg/one vomit

GE with moderate dehydration

Shock therapy:no

Deficit therapy:50-80 ml ORS /kg on duration of 4 hours

Maitenance therapy: normal baby feeds

Ongoing loss: ORS….5 -10 ml / kg /one diarrhea
3-5 ml /kg/one vomit

If baby not tolerates ORS and feeds give the fluids as intravenous

GE with sever dehydration

Shock therapy:20 ml /kg saline

Deficit therapy:100 ml /kg iv fluids((glu 5% +1/2 NS +2meq kcl/100 ml))

Maitenance therapy: 100 ml/kg ………..so on

Ongoing loss: ORS….5 -10 ml / kg /one diarrhea
2-5 ml /kg/one vomit

……………………. Iv fluids given to replace ongoing loss also

Sever dehydration with Na 140 baby 10 kgs

Shock therapy:20*10=200 ml saline 0n ½ hour

Deficit therapy:100*10=1000 ml

Maitenance therapy: 100*10=1000ml

Def+main on 24 hours as(glu5 %+1/2 NS+2meq kcl/100 ml fluids)

((1000+1000))-200=1800…….devided on 24 h=75ml /h

Ongoing loss: ORS….5 -10 ml / kg /one diarrhea
3-5 ml /kg/one vomit

Sever dehydration with Na 178 baby 10 kgs

Shock therapy:20*10=200 ml saline 0n ½ hour

Deficit therapy:100*10=1000 ml ((- shock therapy)) devided on 3 days =800ml

Maitenance therapy: 100*10=1000ml daily

Day 1=260+1000=1260/24=52ml /h

Day2…………………………………………….

Day 3…………………………………………….

Given as ((glu 5%+1/2NS+2meq kcl/100ml))

Ongoing loss: ORS….5 -10 ml / kg /one diarrhea
3-5 ml /kg/one vomit

Follow Na every 4 hours

Sodium decreases too rapidly; either: Increase sodium concentration of intravenous fluid ((1:1..1:2…1:3))or Decrease rate of intravenous fluid by 20 %(if baby is near to be hydrated)

Sodium decreases too slowly; either: Decrease sodium concentration of intravenous fluid or Increase rate of intravenous fluid by 20% (if baby is still dehydrated)

Sever dehydration with Na 120 baby 10 kgs

Shock therapy:20*10=200 ml saline 0n ½ hour

Deficit therapy:100*10=1000 ml

Maitenance therapy: 100*10=1000ml

Def+main on 24 hours as(glu5 %+1/2 NS+2meq kcl/100 ml fluids)

((1000+1000))-200=1800…….devided on 24 h=75ml /h

Here there is Na deficit and should be corrected

So what to do???

If the baby is convulsing??? 3% saline 4 ml/kg 30 minutes

If no convulsions?

Na deficit= ((desired$_{((125))}$-actual))*wt* 0.6

(125-120)*10*.6=30 meq=190ml normal saline corrected on 24 hours

Remember that you already give normal saline as part of deficit therapy

So if the amount given is larger than the calculated Na deficit((190 ml)) ..nothing done

If the amount given is smaller than the calculated Na deficit((190ml)) so complete to 190 which is very rare to do so

Na amount in different solutions

solution	Na amount
Normal saline	154meq/liter
Hypertonic saline	514
Ringer	130
Pediament	38
neomaint	30